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Review

Perioperative management for diabetic surgery: Effect of dexamethasone on blood glucose control – a systematic review and meta-analysis

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Abstract: Dexamethasone (DEX) is widely used for preventing postoperative nausea and vomiting (PONV), but its tendency to induce hyperglycemia in diabetic surgical patients is a concern. This systematic review examines the impact of DEX on perioperative blood glucose control in diabetic patients undergoing surgery. We comprehensively searched databases for randomised controlled trials published between 2019 and 2024. Analysis of six key studies involving 18,217 patients revealed significant increases in blood glucose levels following DEX administration. In diabetic patients maximum glucose levels reached 226.8 [185.4-329.4] mg/dL with 4 mg DEX and 244.8 [201.6-361.8] mg/dL with 8 mg DEX. Non-diabetic patients experienced milder elevations. The risk of hyperglycemia (>180 mg/dL) increased in DEX-treated patients, with one study reporting 10.7% of DEX patients exceeding this threshold. The hyperglycemic effect was most pronounced within 2-24 hr of post-administration and showed a significant interaction with preoperative HbA1c levels. Our findings emphasise the need for vigilant blood glucose monitoring and individualised management strategies when using DEX in diabetic patients. Future research should focus on developing tailored protocols that optimise PONV prevention while minimising hyperglycemic risk.

Keywords: dexamethasone, diabetes, hyperglycemia, perioperative care, postoperative nausea and vomiting

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INTRODUCTION

Perioperative glycemic control is a critical challenge in modern surgical practice, particularly for patients with diabetes mellitus. These individuals face an elevated risk of complications during and after surgical procedures, necessitating meticulous management of blood glucose levels [1]. In this context the widespread use of dexamethasone (DEX) for postoperative nausea and vomiting (PONV) prophylaxis has come under scrutiny due to its tendency to induce transient hyperglycemia [2, 3].

The global prevalence of diabetes is escalating at an alarming rate, with projections suggesting that 783 million adults will be affected by 2045 [4]. This demographic shift amplifies the urgency to elucidate the implications of DEX administration in diabetic surgical patients. While clinical guidelines endorse DEX for PONV prevention, its use presents a complex risk-benefit equation in diabetic populations [5]. Recent studies have demonstrated that even a single intravenous dose of DEX can precipitate significant elevations in blood glucose levels, potentially compromising postoperative recovery and increasing the risk of surgical site infections [6-8].

The hyperglycemic effect of DEX is rooted in its potent glucocorticoid activity, which promotes hepatic gluconeogenesis and induces peripheral insulin resistance [9, 10]. In non-diabetic patients, this effect is typically transient and well-tolerated. However, in diabetic individuals, DEX-induced hyperglycemia may be more pronounced and prolonged, potentially exacerbating pre-existing glucose dysregulation [6, 11]. The magnitude of this effect varies widely in the literature, with some studies reporting average glucose elevations of 30-50 mg/dL, while others observe increases exceeding 100 mg/dL in susceptible individuals [12, 13].

Despite the recognition of these concerns, there remains a paucity of comprehensive evaluations specifically addressing DEX's glycemic effects in diabetic surgical patients. Many existing studies are constrained by limited sample sizes or fail to adequately contextualise their findings within the broader clinical landscape [14, 15]. Recent randomised controlled trials (RCTs) have begun to address this knowledge gap, yet a systematic synthesis of these findings is essential for evidence-based clinical practice [16, 17].

This systematic review and meta-analysis aim to consolidate and critically evaluate data from recent studies conducted between 2019 and 2024. By rigorously assessing the impact of intravenous doses of DEX on blood glucose control in diabetic surgical patients, we seek to provide a nuanced understanding of its metabolic consequences. Our objective is to offer evidence-based recommendations that optimise PONV management while preserving glucose homeostasis, thereby enhancing balanced surgical outcomes for patients with diabetes. The clinical implications of this review extend beyond immediate perioperative care. By elucidating the interplay between DEX administration and glycemic control, we aim to propose broader strategies for perioperative risk stratification and personalised medicine approaches in diabetic surgical patients. Furthermore, this analysis may highlight areas where current guidelines require refinement to account for the specific needs of this vulnerable population.

MATERIALS AND METHODS

This systematic review evaluated the impact of intravenous doses of DEX on perioperative blood glucose levels in diabetic surgical patients. We employed a PICO framework (Population:

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diabetic surgical patients; Intervention: intravenous DEX dose; Comparison: placebo or alternative antiemetic; Outcome: blood glucose levels) and adhered to PRISMA guidelines and the Cochrane Handbook for systematic reviews [18].

Search Strategy and Study Selection

We conducted a comprehensive literature search across MEDLINE, Scopus, Web of Science, the Cochrane Library, and Google Scholar, covering publications from 2019 to 2024. The search strategy combined MeSH terms and keywords related to diabetes, DEX, PONV, blood glucose and RCTs.

Eligibility criteria focused on RCTs administering intravenous DEX for PONV prophylaxis in diabetic patients, comparing outcomes with placebo or alternative antiemetics. We excluded case reports, observational studies and expert opinions. Two independent reviewers screened titles and abstracts, followed by full-text reviews, with discrepancies resolved through consensus.

Data Extraction and Quality Assessment

Data extraction was performed using a standardised form, capturing study characteristics, participant demographics, intervention details and outcome measures. We extracted blood glucose levels at multiple time points, DEX dosage and associated complications. The methodological quality of the included studies was assessed using the JBI critical appraisal instruments for RCTs [19]. Any disagreements were resolved through discussion.

Studies were scored based on the number of "yes" (2 points), "unclear/not applicable" (1 point), and "no" (0 points) responses to the appraisal questions. Studies were classified as high quality if they attained >80% of the possible points, moderate quality for 50-79%, and poor quality if <50% of the points were achieved. All studies included in the review were of moderate to high methodological quality and no studies were excluded based on their assessed quality. This rigorous quality assessment process ensured the reliability and validity of the included evidence, providing a solid foundation for systematic review and meta-analysis.

Statistical Analysis

The primary outcome was the change in blood glucose levels from baseline to peak. We calculated mean differences for continuous outcomes and risk ratios for dichotomous outcomes with 95% confidence intervals. We performed subgroup analyses to explore the impact of DEX dosage and timing of administration on outcomes. Sensitivity analyses were conducted to assess the robustness of findings by excluding studies with a high risk of bias. This rigorous methodological approach ensures a comprehensive and unbiased evaluation of the available evidence, providing a robust foundation for clinical recommendations regarding DEX use in diabetic surgical patients.

RESULTS

Literature Search and Retrieval

Our systematic search strategy yielded 5,389 citations from various databases. After removing duplicates, we excluded 5,280 citations during the initial screening phase. We then evaluated 44 potential studies based on their titles and abstracts. Following a thorough selection and

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review process, we retrieved the full texts of 22 articles. Ultimately, six citations met our eligibility criteria and were included in data extraction [2, 8, 20-23]. An overview of the screening process can be found in Figure 1.

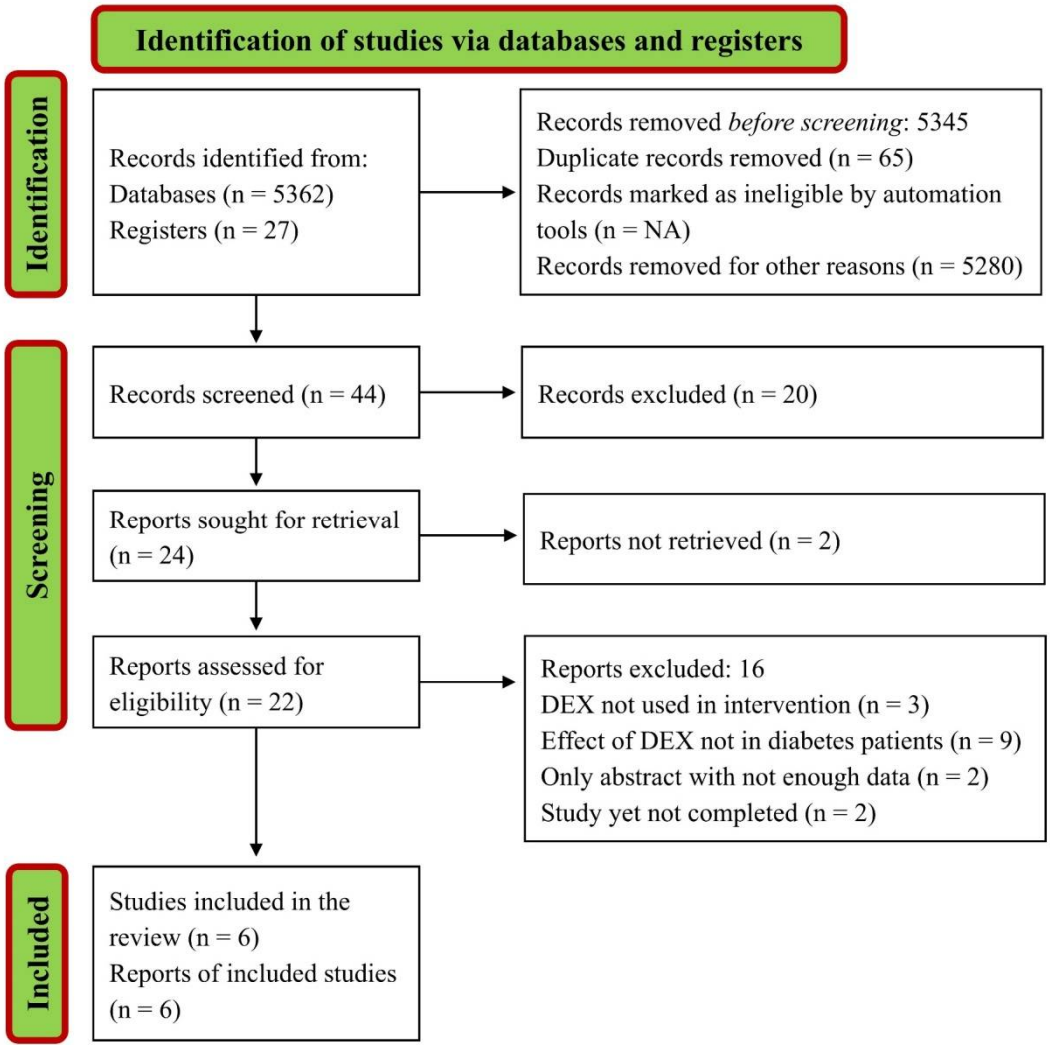

Figure 1. Flow chart of study screening according to PRISMA guidelines [18]

Methodological Quality Assessment

The assessment of the RCTs in Table 1 shows that most studies were conducted with strong attention to quality, following rigorous standards to minimise bias. Generally, these studies excelled in critical areas like randomisation, concealing how participants were assigned to groups, and using dependable outcome measures.

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Table 1. Critical appraisal checklist for RCTs

Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Total score (%)
Peter et al. [22]	Y	Y	Y	Y	Y	U	Y	U	Y	Y	Y	Y	Y	24 (92)
Corcoran et al. [23]	Y	Y	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	25 (96)
Corcoran et al. [8]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	26 (100)
Patil et al. [20]	Y	U	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	24 (92)
Corcoran et al. [2]	Y	Y	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	25 (96)
Barden et al. [21]	Y	Y	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	25 (96)
Total (%)	100	91.67	100	100	100	91.67	100	58.33	100	100	100	100	100	

Y, yes; N, no; U, unclear; Y = 2 points; U = 1 point

Critical appraisal checklist for RCTs:

Q1. Was randomisation used for assignment of participants to treatment groups true?
Q2. Was allocation to treatment groups concealed?
Q3. Were treatment groups similar at baseline?
Q4. Were participants blind to treatment assignment?
Q5. Were those delivering treatment blind to treatment assignment?
Q6. Were outcome assessors blind to treatment assignment?
Q7. Were treatment groups treated identically other than the intervention of interest?
Q8. Was follow-up complete, and if not, were strategies to address incomplete follow-up utilised?
Q9. Were participants analysed in the groups to which they were randomised?
Q10. Were outcomes measured in the same way for treatment groups?
Q11. Were outcomes measured in a reliable way?
Q12. Was appropriate statistical analysis used?
Q13. Was the trial design appropriate, and any deviations from the standard RCT design (individual randomisation, parallel groups) accounted for in the conduct and analysis of the trial?

All studies fully complied with randomisation and allocation concealment, which is key to preventing selection bias and ensuring that participants were fairly distributed across groups. Blinding, which helps reduce potential biases, was applied inconsistently. Five studies blinded both participants and those administering treatments, though one study left some details unclear, which could allow for some performance bias [2]. Outcome assessors were also mostly blinded, with only one study not fully meeting this standard. While there were minor lapses, overall, these efforts helped ensure that assessments were fair and consistent.

On the issue of follow-up, only about 58% of studies provided full follow-up details. This incomplete follow-up might affect the reliability of some findings if participants who dropped out differed from those who stayed. Nevertheless, all studies used intention-to-treat analysis, which reduces bias by including all participants in the final results, whether or not they completed the study.

Even though all studies reported using reliable outcome measures, there were some differences in how these were applied. For example, variations in devices used for measuring blood glucose levels made it difficult to compare results directly across studies. So, while each study

aimed to use reliable tools, this lack of standardisation could affect the comparability of results. The studies consistently maintained high standards in other areas, like ensuring that treatment groups were similar initially and using appropriate statistical methods. They also clearly reported their intended outcomes and followed transparent reporting guidelines, which helped make their results easier to understand and compare.

Study Characteristics

This systematic review includes seven RCTs investigating the effects of perioperative DEX administration, with a total of 18,217 participants. The studies were conducted between 2019 and 2024, encompassing a diverse range of surgical procedures including non-cardiac, non-obstetric and abdominal surgeries [2, 8, 20-23]. Sample sizes varied widely, ranging from 80 to 8,840 participants [21, 23]. All studies compared DEX administration to placebo or no treatment or ondansetron (4 mg) treatment, with DEX doses ranging from 0.15 to 8 mg/kg [2, 8, 20-23]. The timing of administration was consistently at or shortly after anesthesia induction [2, 8, 20-23].

Primary outcomes across studies included changes in blood glucose levels [20, 22, 23], surgical site infections [8] and various inflammatory markers [21]. Secondary outcomes encompass PONV, pain scores, quality of recovery and specific inflammatory mediators [8, 20, 22, 23]. Most studies employed robust methodologies with adequate randomisation, allocation concealment, blinding of participants, care providers and outcome assessors [2, 8, 20-23]. Follow-up periods ranged from immediate postoperative hours to 6 months post-surgery [8, 22]. The studies were geographically diverse, taking place in Australia, New Zealand, Hong Kong, South Africa and the Netherlands [2, 8, 21, 23] and in India [20, 22]. A summary of the characteristics of all the trials included is presented in Table 2. The studies collectively addressed both the efficacy and safety of perioperative DEX, providing a comprehensive overview of its effects on glycemic control, postoperative complications and inflammatory responses in diverse surgical populations.

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Table 2. Characteristics under study (n=18,217)

Citation	Year	Study location	Group (number of patients, n)	Point of care BGA	IC	Intervention	Outcome	DEX adverse side effect
Corcoran et al. [23]	2019	Australia, Hong Kong, New Zealand, South Africa, Netherlands	T1: DEX 8 mg (n=4444) Cont: Placebo (n=4436)	Yes	NR	Single dose of intravenous DEX (8 mg) or placebo after induction of anaesthesia	Primary: Maximum blood glucose within 24 hr of surgery Secondary: Interaction between HbA1c and DEX, surgical site infection, quality of recovery, PONV, pain scores	Persistent wound pain at 6 months, hyperglycemia, no significant increase in infections or other serious adverse events reported
Corcoran et al. [2]	2021	Australia	T1: DEX 4 mg (n=103) T2: DEX 8 mg (n=96) Cont.: Placebo (n=103)	Blood glucose measured within 24h of surgery	NR	Single dose of intravenous DEX (4 mg or 8 mg) or placebo after induction of anaesthesia	Primary: Maximum blood glucose within 24 h of surgery Secondary: Interaction between HbA1c and DEX	None reported
Corcoran et al. [8]	2021	Australia, Hong Kong, New Zealand	Treatment: DEX 8 mg (n=4372) Cont.: Placebo (n=4353)	Yes, blood glucose measured using point-of-care devices at multiple time points	NR	Single 8 mg intravenous dose of DEX or matching placebo after induction of anaesthesia	Primary: Surgical-site infection within 30 days after surgery Secondary: Deep or organ-space surgical-site infection at 90 days, quality of recovery, chronic postsurgical pain, new onset disability or death at 6 months	-Hyperglycemic events in non-diabetic patients: 0.6% in DEX group vs 0.2% in placebo group -Insulin treatment in non-diabetic patients: 0.5% in DEX group vs 0.1% in the placebo group -Higher blood glucose elevation from baseline in DEX group -Possible increase in new onset chronic postsurgical pain at 6 months (8.7% vs 7.1%)

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Table 2 (Continued).

Citation	Year	Study location	Group (number of patients, n)	Point of care BGA	IC	Intervention	Outcome	DEX adverse side effect
Barden et al. [21]	2021	Australia	T1: DEX 4 mg (n=27) T2: DEX 8 mg (n=26) Cont: Placebo (n=27)	Yes, blood glucose measured	NR	Single intravenous dose of DEX (4 mg or 8 mg) or placebo administered within 5 min. of induction of anesthesia	Primary: Effects on eicosanoids (LTB4, 20-HETE), SPM pathway intermediates, and SPM Secondary: Neutrophil and lymphocyte counts, hs-CRP	- Increased neutrophil count- Increased plasma LTB4- Increased plasma 20-HETE- No significant effect on lymphocyte counts
Peter et al. [22]	2022	India	T: DEX 0.15 mg (n=75) Cont: Placebo (n=75)	Yes, using a calibrated glucometer (On Call Plus glucometer, Acon Labs, USA)	NR	Single dose of DEX (0.15 mg/kg) vs placebo	Primary: Blood glucose levels at multiple time points Secondary: PONV, pain, fever, SSI, LOS	No significant adverse events reported; incidence of PONV, SSI and fever similar between groups
Patil et al. [20]	2024	India	T: DEX 8 mg (n=60) Cont: Ondansetron (n=60)	Yes, using a glucometer	NR	Single intravenous dose of 8 mg DEX or 4 mg Ondansetron	Primary: Blood glucose levels at various time points Secondary: PONV, pain scores	No significant adverse effects reported

Note: BGA= blood glucose assessment; T= Treatment; Cont.= Control; IC= Insulin coverage

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Risk of Bias Assessment

All six RCTs included in this review have demonstrated sound methodological quality with a low risk of bias regarding random sequence allocation and reporting bias (Table 3) [2, 8, 20-23]. In all studies the randomisation process was satisfactory in that it correctly showed a balanced distribution of participants among the groups. In addition, in all trials there was adequate concealment of allocation, which precludes selection bias.

Table 3. Risk of bias ratings for RCTs

Question	Corcoran et al. [23]	Corcoran et al. [2]	Peter et al. [22]	Corcoran et al. [8]	Barden et al. [21]	Patil et al. [20]
Was randomisation adequate?	Yes	Yes	Yes	Yes	Yes	Yes
Was allocation concealment adequate?	Yes	Yes	Yes	Yes	Yes	Yes
Did the strategy for recruiting participants into the study differ across study groups?	No	No	No	No	No	No
Were groups similar at baseline?	Yes	Yes	Yes	Yes	Yes	Yes
Were outcome assessors masked?	Yes	Yes	Yes	Yes	Yes	Yes
Were care providers masked?	Yes	Yes	Yes	Yes	Yes	Yes
Were patients masked?	Yes	Yes	Yes	Yes	Yes	Yes
Did researchers rule out any impact from a concurrent intervention or an unintended exposure that might bias results?	Yes	Yes	Yes	Yes	Yes	Yes
Did variation from the study protocol compromise the conclusions of the study?	No	No	No	No	No	No
Was overall attrition 20% or higher or was differential attrition 15% or higher?	No	No	No	No	No	No
Did attrition result in a difference in group characteristics between baseline and follow-up?	No	No	No	No	No	No
Did the study use intention-to-treat analysis?	Yes	Yes	Yes	Yes	Yes	Yes
Are the inclusion/exclusion criteria measured using valid and reliable measures, implemented consistently across all study participants?	Yes	Yes	Yes	Yes	Yes	Yes
Were outcome measures equal, valid and reliable?	Yes	Yes	Yes	Yes	Yes	Yes
Were potential outcomes pre-specified by researchers and were all pre-specified outcomes reported?	Yes	Yes	Yes	Yes	Yes	Yes

Importantly, all studies have used proper blinding. All six trials masked outcome assessors, care providers, and patients, significantly reducing the risk of performance and detection bias [2, 8, 20-23]. However, it is worth noting that perfect blinding in perioperative settings can be challenging, particularly for care providers, and the effectiveness of blinding was not always explicitly verified. Inclusion/exclusion criteria and outcome assessments were measured consistently using valid and reliable measures. All pre-specified outcomes were reported with no obvious omissions; therefore, the risk of selective reporting bias has to be considered low. Nevertheless, the possibility of outcome reporting bias cannot be entirely ruled out without access to detailed study protocols.

The risks of attrition bias and loss of randomisation benefits are further reduced because intention-to-treat analysis was performed. Attrition was well handled across all the studies, with none of the trials reporting overall attrition rates of 20% or higher or differential attrition of 15% or higher. In none of the studies did the attrition result in differences in group characteristics at baseline and follow-up, thus maintaining the comparability of the groups throughout the trial.

It is important to note that the uniformly positive assessment across all studies and domains is unusual and warrants cautious interpretation. This could reflect exceptionally well-conducted research, but it might also suggest potential overestimation of study quality or publication bias, where studies with less favourable methodological profiles may not have been published or included in this review. Furthermore, the assessment is primarily based on reported information, which may not always fully reflect the actual conduct of the studies. There might be distinctions in study execution that are not described in the published reports.

Effect of DEX on Blood Glucose Levels in Surgical Diabetic Patients

The studies reviewed in this systematic analysis consistently demonstrated that DEX administration, regardless of dosage, is associated with elevated postoperative blood glucose levels. The magnitude, timing and persistence of these elevations varied across patient groups and dosages, with significant implications for perioperative management. The findings on the glucose-altering effects of DEX in the perioperative period are summarised in Table 4.

In Corcoran et al.[2] baseline blood glucose levels among non-diabetic patients were similar across placebo, 4 mg, and 8 mg DEX groups. However, maximal perioperative blood glucose was higher in both DEX groups compared to placebo, with the increase more pronounced in patients with diabetes. Notably, for each 1% increase in preoperative HbA1c, perioperative blood glucose increased by 72 mg/dL, illustrating a dose-dependent response in patients with poor glycemic control.

In Peter et al.[22] patients administered DEX showed higher fasting and postprandial blood glucose levels on postoperative days 1, 2 and 3. In contrast to the placebo group, around 10.7% of DEX recipients had glucose levels exceeding 180 mg/dL, indicating a significant and prolonged hyperglycemic response. The study highlights that DEX not only induces an initial spike in blood glucose but also sustains elevations over several days, which could complicate recovery in at-risk patients. Similarly, Patil et al. [20] observed an immediate peak in blood glucose within 2 hr post-DEX, with levels remaining elevated up to 24 hr. The data indicate that DEX rapidly raises glucose levels, potentially requiring close monitoring during the immediate postoperative period. These results align with other studies suggesting that DEX's hyperglycemic effects are not transient and may demand insulin coverage for patients predisposed to glucose fluctuations.

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While Barden et al. [21] did not focus on glucose alone, they noted elevated neutrophil counts and increased inflammatory markers such as LTB4 and 20-HETE following 8 mg DEX administration. Although glucose levels were only slightly elevated in comparison with other studies, this increased inflammatory response may signal broader systemic effects associated with DEX. Corcoran et al. [8] found that 0.6% of non-diabetic patients in the DEX group experienced hyperglycemia versus 0.2% in the placebo group, showing that even non-diabetics may experience elevated glucose levels following DEX administration. This increase in hyperglycemic events further supports the need for caution and potentially more frequent glucose monitoring in all patients receiving DEX perioperatively.

Table 4. Impact of DEX on blood glucose levels in selected clinical trials

Study	Population	Intervention	Baseline glucose level	Maximum glucose level	Notable finding
Corcoran et al. [2]	Non-diabetics: 81 (placebo), 81 (4 mg), 77 (8 mg); Diabetics: 22, 22, 19	Placebo, DEX 4 mg, DEX 8 mg	Non-diabetics: 95.4 [82.8-104.4], 90 [84.6-97.2], 90 [75.6-106.2] mg/dL Diabetics: 118.8 [108-149.4], 109.8 [99-187.2], 120.6 [100.8-149.4] mg/dL	Non-diabetics: 108 [95.4-122.4], 113.4 [99-131.4], 113.4 [104.4-133.2] mg/dL Diabetics: 185.4 [145.8-223.2], 226.8 [185.4-329.4], 244.8 [201.6-361.8] mg/dL	Significant interaction with pre-op HbA1c; higher blood glucose in diabetics with DEX 8 mg
Peter et al. [22]	150 (75 DEX, 75 control)	Placebo, DEX 8 mg	Day 1 fasting: DEX 98.04 ± 21.89 mg/dL, Control 86.96 ± 10.28 mg/dL	Day 1 postprandial: DEX 139.16 ± 20.59 mg/dL, Control 128.95 ± 10.53 mg/dL	10.7% of DEX patients >180 mg/dL; sustained elevations on PODs 1-3 days
Patil et al. [20]	120 (60 DEX, 60 control)	Placebo, DEX 8 mg	Baseline: Not reported	Peak: DEX 128.62 ± 8.87 mg/dL at 2 hr	Immediate rise within 2 hours, elevated for 24 hr post-surgery
Barden et al. [21]	Non-diabetics: 27 placebo, 26 (8 mg), 27 (4 mg)	Placebo, DEX 4 mg, DEX 8 mg	DEX 4 mg: 95.4 ± 30.6 mg/dL; Placebo: 97.2 ± 18.0 mg/dL	Minimal rise, high neutrophils, elevated LTB4, 20-HETE	Increased inflammatory markers, mild hyperglycemia
Corcoran et al. [2]	8725 (4372 DEX, 4353 placebo)	Placebo, DEX 8 mg	Not reported	0.6% hyperglycemia in non-diabetics with DEX, 0.2% in placebo	Increased hyperglycemia in non-diabetics with DEX

DISCUSSION

The perioperative use of DEX in diabetic patients undergoing surgery presents a complex clinical challenge, considering its beneficial antiemetic and anti-inflammatory effects against its potential to exacerbate hyperglycemia. This systematic review and meta-analysis provide critical insights into this delicate equilibrium, offering a nuanced understanding of DEX's impact on glucose homeostasis in the surgical setting.

Our analysis reveals a consistent and significant hyperglycemic effect of DEX in diabetic surgical patients. This effect, while anticipated, demonstrates a magnitude and duration that warrant careful consideration. The study by Corcoran et al. [2] indicated a dose-dependent relationship, with 8 mg of DEX inducing more pronounced hyperglycemia than 4 mg. This dose-response pattern aligns with the known pharmacodynamics of glucocorticoids but highlights the need for judicious dosing in diabetic patients.

Interestingly, the hyperglycemic effect was not uniform across all patients. The interaction between baseline HbA1c levels and DEX-induced hyperglycemia, as reported by Corcoran et al. [2], suggests a personalised risk profile. The finding that each 1% increment in HbA1c corresponded to a 72 mg/dL elevation in maximal perioperative glucose concentration underscores the importance of preoperative glycemic control. This observation opens avenues for preoperative risk stratification and tailored management strategies. The temporal profile of DEX-induced hyperglycemia merits particular attention. Patil et al. [20] observed peak glucose levels at approximately 2-hr post-administration, with elevations persisting for up to 24 hr. This protracted effect extends beyond the immediate postoperative period, necessitating vigilant monitoring well into the recovery phase. The prolonged hyperglycemic effect aligns with DEX's known pharmacokinetic profile but raises questions about the optimal timing of administration and duration of enhanced glucose surveillance.

While the clinical effects of DEX-induced hyperglycemia are well-documented, the underlying molecular mechanisms in the surgical context remain incompletely understood. DEX's glucocorticoid activity promotes hepatic gluconeogenesis and induces peripheral insulin resistance [9]. However, the interplay between these effects and the acute stress response to surgery presents a complex physiological milieu. Future research should elucidate these molecular pathways, potentially identifying targets for pharmacological intervention to mitigate hyperglycemia without compromising DEX's beneficial effects.

The findings of this review have profound implications for the perioperative management of diabetic patients. The demonstrated efficacy of DEX in reducing PONV, as reported by Corcoran et al. [23], must be weighed against its hyperglycemic potential. This risk-benefit analysis should be individualised, considering factors such as the patient's baseline glycemic control, the nature and duration of the surgical procedure, and the anticipated postoperative course.

Our analysis suggests that while DEX can be used safely in well-controlled diabetic patients, stringent glucose monitoring protocols are essential. The development of algorithmic approaches to perioperative glucose management in patients receiving DEX constitutes a critical area for future research and clinical guideline development.

A significant limitation in the current literature is the lack of data on long-term outcomes associated with perioperative DEX-induced hyperglycemia. While acute glycemic fluctuations are well-documented, their impact on surgical site infections, wound healing, and long-term glycemic control remains unclear. Longitudinal studies examining these outcomes are urgently needed to present evidence-based guidelines for DEX use in diabetic surgical patients.

CONCLUSIONS AND FUTURE DIRECTIONS

This systematic review provides a comprehensive understanding of the impact of perioperative DEX on blood glucose control in diabetic surgical patients. Our findings suggest that DEX induces transient hyperglycemia, but its magnitude and clinical significance vary based on

individual patient factors. While vigilant glucose monitoring is crucial, our review supports the judicious use of DEX for PONV prophylaxis in diabetic patients.

The complexities revealed by this review point to several promising research directions. The development of glucocorticoid analogues that retain anti-inflammatory and antiemetic properties while minimising hyperglycemic effects could revolutionise perioperative care for diabetic patients. Additionally, the integration of continuous glucose monitoring technologies and closed-loop insulin delivery systems into perioperative care protocols offers the potential for real-time, precise glycemic management.

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